


CAS4N
XC 2
87E59



Select Committee on the Environment



Digitized by the Internet Archive
in 2012 with funding from
University of Guelph, University of Windsor, York University and University of Toronto Libraries



LEGISLATIVE ASSEMBLY
ASSEMBLÉE LÉGISLATIVE

**SELECT COMMITTEE
ON THE ENVIRONMENT**

**FIRST REPORT, 1987
ACID RAIN IN ONTARIO**

**3rd Session, 33rd Parliament
36 Elizabeth II**

SELECT COMMITTEE ON
THE ENVIRONMENT



LEGISLATIVE ASSEMBLY
ASSEMBLÉE LÉGISLATIVE

TORONTO, ONTARIO
M7A 1A2

COMITÉ SPÉCIAL SUR
L'ENVIRONNEMENT

The Honourable Hugh Edighoffer, M.P.P.
Speaker of the Legislative Assembly

Sir,

Your Select Committee on the Environment has the honour
to present its First Report for the Third Session of the
Thirty-third Parliament and commends it to the House.

A handwritten signature in dark ink, reading "Don Knight".

Don Knight, M.P.P.
Chairman

Queen's Park
May, 1987

**MEMBERSHIP OF
THE SELECT COMMITTEE ON
THE ENVIRONMENT**

DONALD KNIGHT
Chairman of the Committee

GORDON MILLER
Vice-Chairman of the Committee

**BRIAN CHARLTON
ERNIE EVES
PHIL GILLIES
RUTH GRIER
JAMES HENDERSON**

**MARGARET MARLAND
PETER PARTINGTON
DAVID SMITH
LARRY SOUTH**

TANNIS MANIKEL
Clerk of the Committee

DAVID NEUFELD
Research Officer

Other members who served on the Committee during the hearings on this Order of Reference: David R. Cooke (Kitchener), Herbert Epp, Susan Fish, Ray Haggerty, Tony Lupusella, Remo Mancini, Allan McLean, Karl Morin-Strom, Jean Poirier, Gilles Pouliot, David Ramsay, Yuri Shymko, David W. Smith, Bud Wildman and Douglas J. Wiseman.

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
ONTARIO HYDRO'S BANKING PROVISIONS	2
PUBLIC CONSULTATION	4
ANNUAL REPORTING BY ONTARIO HYDRO	5
ANNUAL REPORTING BY INCO, FALCONBRIDGE AND ALGOMA	6
REGULATION OF OTHER SOURCES OF SULPHUR DIOXIDE	7
UNALLOCATED EMISSIONS	8
USE OF EMISSION CONTROL BY-PRODUCTS	8
ECONOMIC INCENTIVES FOR ABATEMENT	9
DAMAGES AND RESEARCH NEEDS	11
APPENDIX A TERMS OF REFERENCE	
APPENDIX B LIST OF WITNESSES	
APPENDIX C LIST OF EXHIBITS	

INTRODUCTION

On January 27, 1987 the House ordered that the Select Committee on the Environment, established on July 19, 1985, be empowered to review and report its recommendations on bilateral environmental issues as they affect Ontario (Appendix A). The Committee subsequently decided to review Ontario's Countdown Acid Rain program in the weeks following the adjournment of the House on February 12, 1987. To that end, eleven days of hearings were held. During this time the Committee also toured Ontario Hydro's Lakeview Generating Station in Toronto as well as the smelting operations of Inco and Falconbridge in Sudbury. The Committee wishes to express appreciation to all the witnesses who shared their knowledge and concerns with the Committee (Appendix B). The Committee also wishes to thank its support staff, Ms Tannis Manikel, for her work as Clerk of the Committee and Mr. David Neufeld, of the Legislative Research Service for his work as Research Officer to the Committee.

In December 1985 the Ontario Ministry of the Environment announced its acid rain abatement program. The abatement program, sometimes called the Countdown Acid Rain program, is made up of five regulations under the Environmental Protection Act. Four of the regulations are directed specifically at Ontario's major sources of sulphur dioxide: Inco Limited, Falconbridge Limited, Algoma Steel Corporation, and Ontario Hydro. Together, these organizations account for over 80 percent of total provincial sulphur dioxide emissions. The legal limits for the four organizations in 1994, totalling 665,000 tonnes, represent a decline of approximately 64 percent from their allowable base emissions in 1980. The fifth regulation applies to new and modified boilers which use fuel oil or coal as fuel. It limits the sulphur content of fuel used or limits equivalent sulphur dioxide emissions. The objective of the Countdown Acid Rain program is to achieve a target objective of 885,000 tonnes of sulphur dioxide emissions in Ontario on an annual basis by 1994.

While the Committee chose to focus on the control of acid rain in Ontario, it recognizes that the United States must implement a significant acid deposition control program if the health of Ontario's citizens and environment is to be protected. For example, it has been estimated that at least 80 percent of the sulphate and nitrate wet deposition in southwestern Ontario is due to emissions from the United States. In addition it has been estimated that for every tonne of sulphur dioxide emissions from Canada that crosses into the United States, approximately 3.5 tonnes of sulphur dioxide emissions from the United States cross into Canada.

ONTARIO HYDRO'S BANKING PROVISIONS

Based upon its hearings and deliberations, the Committee concludes that the banking provisions in Ontario Regulation 662/85 are of major concern. The banking provisions for Ontario Hydro appear to be without precedent. Use of banking in the United States is difficult to compare with Hydro's banking provisions as the former requires that all banked emission reduction credits be surplus, enforceable, permanent and quantifiable. These credits are also part of an emissions trading policy which does not exist in Canada. Ontario Regulation 662/85 does not require that banked emissions reflect permanent reductions and, unlike the U.S. policy, withdrawals of emissions would not result in rewriting the source's regulations to reflect a reduced level of allowable emissions. Emission reductions in the U.S. policy are not added together year after year. They are credited once, as they reflect permanent emission reductions.

When point sources are in compliance with an emission limit or standard in Canada they are generally not allowed to add together the difference between actual and allowable limits in successive years and then emit this total in future years. Any pollution not emitted is simply that. Ontario Hydro's banking provisions introduce a system of giving one corporation credit for not emitting pollution up to the level it is allowed in any one year, while other corporations are not given this opportunity.

The Committee shares the concerns expressed by various witnesses regarding potential negative political ramifications in the United States as a result of the banking provisions. Opponents of acid rain controls in the United States scrutinize Canadian control programs for any perceived loopholes which allow established limits to be circumvented. The banking provisions could undermine the credibility of Ontario's acid rain control program. The Committee is also concerned about the potential environmental and health impacts in Ontario from emission swings in the United States were that country to adopt banking provisions in an acid rain abatement strategy similar to Ontario Hydro's.

Based on the evidence presented the Committee concludes that Ontario Hydro has numerous options and mixes of options to achieve its emissions limits without banking. These include:

- reductions in the sulphur levels of fuel through increased use of low sulphur coal, low sulphur oil, natural gas, and improved coal washing, as well as other coal desulphurization processes.
- reductions in coal consumption through increased use of other supplies of electricity, increased power purchases, strategic conservation and demand management, and reduced export sales.
- installation of control technology to reduce nitrogen oxide and sulphur dioxide emissions.

The Committee also recognizes that, in the event of an extended and unplanned disruption in the operation of a nuclear generating station or other generating facility in the Province, Ontario Hydro could approach the Government to be given special consideration. The banking provisions are not required to be able to do this.

Recommendation

Your Committee, therefore, recommends that:

1. The banking provisions for Ontario Hydro, in sections 7 and 8 of Ontario Regulation 662/85, should be deleted from the regulation and not replaced with any similar provision.

PUBLIC CONSULTATION

Based upon its hearings and deliberations, the Committee concludes that opportunity for public input at various stages of the acid rain abatement program in Ontario is warranted. In particular, the Committee is of the opinion that public hearings should be held before a Committee of the Legislative Assembly to review the December 1988 final reports of the four regulated sources. In addition, opportunity for public hearings should be provided at any time amendments to existing regulations or new regulations are proposed. Two procedures are needed. First, advance public notice of proposed regulations (new or amended) is required. Second, opportunity for public consultation must be provided before proposed regulations are filed with the Registrar of Regulations. The Committee is of the opinion that public hearings should be held by a Committee of the Legislative Assembly to scrutinize and examine the proposals.

The obligation to publish draft amendments to acid rain regulations as well as draft new acid rain regulations should be written into the Environmental Protection Act. The requirement for public consultation should also be written into the statute.

The Committee notes that these requirements also generally reflect the recommendation in a report of the Standing Committee on Regulations and Other Statutory Instruments in 1983 that there be more emphasis on incorporating suitable Notice and Comment procedures in appropriate Provincial Acts.

Recommendation

Your Committee, therefore, recommends that:

2. Public hearings should be held by a designated Committee of the Legislative Assembly to review the final progress reports to be submitted by Inco, Falconbridge, Algoma and Ontario Hydro, before December 1988.

3. The Environmental Protection Act should be amended to include a "Notice and Comment" procedure to operate in the following manner:

- All proposed regulations pertaining to acid rain control must be published in The Ontario Gazette and in appropriate newspapers in the province, accompanied by an invitation for briefs or submissions on the proposals. Proposed regulations include both new regulations and regulations which amend or revoke existing regulations.
- Following publication of the proposed regulations, public hearings must be held on the proposed regulations by a designated Committee of the Legislative Assembly.
- No proposed regulations may be filed with the Registrar of Regulations before the designated Committee of the Legislative Assembly has completed its hearings and tabled its final report; or before a minimum of 90 days after their publication in The Ontario Gazette and in appropriate newspapers in the province.

ANNUAL REPORTING BY ONTARIO HYDRO

Based upon its hearings and deliberations, the Committee has noted the absence of reporting requirements for Ontario Hydro. Despite the fact that Ontario Hydro has voluntarily submitted semi-annual reports to the Ministry of the Environment, there is no such requirement in its regulation (O. Reg. 662/85). This is not consistent with fact that Inco, Falconbridge, and Algoma are all required to submit semi-annual written reports to the Minister prior to December 1988, as well as after 1988, which outline the progress being made in implementing their respective abatement programs. The Committee is of the opinion that Ontario Hydro should also be required to submit semi-annual progress reports prior to, and after 1988 which outline the corporation's plans for achieving compliance with its emission limit.

Each report should include information on Ontario Hydro's expected electricity demand; the amount and sulphur content of coal and other fossil fuels to be used; the anticipated sulphur dioxide and nitrogen oxide emissions from each fossil fuel-fired boiler and progress toward installing abatement technology; the methods that will be used to achieve compliance in that year; contingency plans for unexpected events or increased demand; and total anticipated sulphur dioxide and nitrogen oxide emissions for each of the next five years.

Based upon its hearings and deliberations, the Committee has also identified specific improvements that should be incorporated into subsequent reports. These include the need for Ontario Hydro to review and report on the potential use of coal desulphurization processes in addition to coal washing, and to investigate the potential problems and opportunities of using natural gas as a replacement for coal. In addition, the Committee found that Ontario Hydro should formulate a plan for pursuing strategic conservation in Ontario to reduce electrical demands in the Province. The Committee supports the continued investigation of opportunities for increasing the economic attractiveness of western Canadian bituminous coal. Ontario Hydro should also conduct a survey of its residential customers regarding their willingness to accept rate increases if they would be guaranteed that the increased revenues would be spent solely for the purpose of emission abatement.

ANNUAL REPORTING BY INCO, FALCONBRIDGE AND ALGOMA

Based upon its hearings and deliberations, the Committee has identified specific improvements that could be made in subsequent reports. Technical details and results of each corporation's ongoing research and development of control options should be filed in future reports. In addition, the extent of sulphur dioxide emission reductions associated with each component of the smelters' control strategies should be detailed. Flow sheets which indicate where various forms of sulphur go and in what amount, as affected by the proposed options, should be presented. Emission algorithms which predict emission rates that result from changes in process parameters should also be developed as an adjunct to monitoring emissions.

In addition, the Committee is of the opinion that Algoma Steel should be required to develop additional control strategies at any time the company decides to increase production above its downsized capacity of 900,000 tonnes annual sinter production. This would be best ensured by amending its regulation (O. Reg. 663/85) to require the development of compliance plans under such circumstances.

REGULATION OF OTHER SOURCES OF SULPHUR DIOXIDE

The Committee is concerned that the Countdown Acid Rain program fails to control existing sources of acid rain other than the four major sources in the Province. In 1985 sources other than Inco, Falconbridge, Algoma and Ontario Hydro emitted an estimated 241,000 tonnes of sulphur dioxide or 16 percent of total sulphur dioxide emissions in Ontario. By 1994 it is estimated that such other sources will account for approximately 25 percent of sulphur dioxide emissions in the Province. There may be up to 200 point sources in Ontario currently emitting over 100 tonnes of sulphur dioxide per year. In addition to the four major sources, 30 sources emitted more than 1,000 tonnes annually in 1984, of which 12 sources emitted more than 5,000 tonnes per year.

Various alternatives are available to reduce sulphur dioxide emissions from sources in addition to the four major emitters. One option is the application of best available technology requirements to new and existing sources. Another option is the application of sulphur fuel content limits to all point sources emitting in excess of a specified annual amount, such as 100 tonnes sulphur dioxide per year. A third option is the development of excess emission charges for all sources emitting in excess of a specified amount of sulphur dioxide annually. A fourth option is the development of an emissions trading program on a regional basis, wherein proximate emission sources are required to reduce emissions to a specified level through a clearly defined and regulated limited emissions trading scheme.

The Committee is of the opinion that the Ministry of the Environment should investigate and provide opportunity for public review of the options, and report their findings to the Committee of the Legislative Assembly that has been recommended to review the final progress reports to be submitted by the four major sources by December 1988.

UNALLOCATED EMISSIONS

A spokesman for the federal Department of Environment indicated that 175,000 tonnes of sulphur dioxide emissions remain to be allocated among the provinces participating in the national acid rain abatement agreement of February 1985. He also indicated that Manitoba's draft regulations could result in that province assuming an extra 100,000 tonne reduction in addition to their commitment made in 1985. It was also pointed out that Inco was required to investigate the possibility of reducing emissions by a further 90,000 tonnes above that required by 1994, down to 175,000 tonnes per year.

As previously indicated, the Committee concludes that there is an opportunity to regulate sources of sulphur dioxide in addition to the four major emitters. The Committee also noted with interest that modelling information supplied by the Ministry of the Environment indicated that a 50 percent reduction in Canada at the theoretically least cost would include emissions in Ontario being reduced to 740,000 tonnes annually. In contrast, the Countdown Acid Rain program has a target objective of 885,000 tonnes. While it is recognized that the modelling results are based on numerous assumptions, the above factors combined lead the Committee to conclude that Ontario should assume responsibility for additional reductions of 75,000 tonnes of sulphur dioxide by 1994 to make up the shortfall in unallocated emission reductions from the 1985 national acid rain abatement agreement.

USE OF EMISSION CONTROL BY-PRODUCTS

The flue gas desulphurization and furnace limestone injection technologies being investigated by Ontario Hydro all create by-products of a high sulphur content. The processes create wet or dry residues containing varying concentrations of calcium sulphite, calcium sulphate (gypsum), unreacted lime, fly ash, and other impurities. It has been indicated that these by-products are considered to be wastes which will require suitable disposal. However, the Committee is of the opinion that Ontario Hydro should be directed to conduct and report on an evaluation of the potential to market gypsum, unreacted lime and other by-products of its proposed flue-gas desulphurization and in-burner desulphurization units. In addition, Ontario Hydro should review and report on the potential for designing and implementing a flue gas desulphurization system which creates commercial grade gypsum as a by-product.

Both Inco and Falconbridge have indicated that increased capture of high strength sulphur dioxide off-gas to produce sulphuric acid will likely play an important role in reducing sulphur dioxide emissions to meet their 1994 emission limits. However company spokespersons indicated that marketing sulphuric acid could become increasingly difficult in the future due to the fixed and competitive market. They also spoke favorably of the concept of establishing a fertilizer plant in the Sudbury basin which would create a local market for sulphuric acid. It was noted that the distance of phosphate deposits from the acid limited the current economic viability of such a plant without some form of government financial support. The Committee is of the opinion that the Ministry of Northern Development and Mines should assemble, and make available, all evaluations relating to the development of a fertilizer plant in the Sudbury basin and provide an updated assessment of the problems and opportunities associated with such an undertaking.

ECONOMIC INCENTIVES FOR ABATEMENT

During the Committee hearings, on March 10, 1987, Ontario and Ottawa signed an agreement on sulphur dioxide reduction. The agreement indicated that Canada and Ontario are each prepared to provide up to \$85 million to cost-share smelter modernization/pollution abatement measures in Ontario. Falconbridge spokesmen indicated to the Committee that the company would be counting on government financial assistance. While Inco indicated it preferred to avoid government assistance, it told the Committee it was not ruling out government support. One option available to the Ministry of the Environment in terms of financial assistance is to provide repayable interest-bearing loans to emission sources based on demonstrated need, with servicing conditions tied partly to nickel and copper prices. Alternatively, emission sources could be awarded grants which are limited to a maximum proportion (e.g. 40%) of the capital cost of any particular item of a control program. The March 10 agreement should not be seen to preclude additional financial support where circumstances warrant.

The Committee heard testimony that the history of pollution control in Ontario, and across North America, is a history of regulations written and violated, and of compliance deadlines extended and postponed. The Province of Ontario has a regulatory system that reflects the traditional environmental protection strategy in North America. It is known as "Command and Control"

management, where regulatory agencies rely primarily on voluntary compliance, moral suasion, threat of prosecutions, and fines to secure industry compliance.

Under the Command and Control system the incentive for a firm to comply with regulated limits extends only to the degree to which it perceives that there is a relatively high probability of being detected, prosecuted and successfully convicted for non-compliance, and being fined an amount equivalent to the costs of researching, developing, installing and operating the pollution control system required to achieve its legal limits. In addition, given the value of capital to a firm, it has a financial incentive to delay investment in pollution control technology as long as possible. The current system also fails to provide incentives to investigate new technologies to reduce pollution beyond the level legally required.

Given the above limitations, various economic mechanisms could be applied by the Ministry of the Environment to provide a strong incentive for sources to comply with their regulations. These include the use of financial assurances and automatic delay penalties or excess emission charges. Use of financial assurance would mean that a company would be obliged to deposit a calculated sum of money or its equivalent in bonds, guarantees or letters of credit with the Ministry of the Environment for the performance of a specified action. The deposited money would provide an incentive for the affected company to undertake the pollution abatement required in the regulations. As the approved abatement program was completed, the deposited money would be refunded until the entire sum was paid back. The size of the deposit may need to approach the cost of the abatement program to provide a strong incentive for its timely implementation.

Delay penalties or excess emission charges are financial penalties assessed against a polluter when deadlines for agreed-to programs are not met or emission levels are exceeded. The penalties would be calculated on the basis of the costs of abatement, or savings realized by companies in avoiding compliance with clean-up schedules or emission limits. Under appropriate legislation, penalties would be assessed automatically and levied by the Ministry of the Environment rather than the courts. Thus, delay penalties would not replace prosecutions and fines. They would act as automatic charges for emissions in excess of an agreed-to limit.

DAMAGES AND RESEARCH NEEDS

Based on evidence presented by witnesses and a review of the literature, a significant number of research needs have been identified. Because of the complexity of the environment and the many forces and interactions within biophysical systems, direct cause–effect relationships and dose–response rates of acidic deposition to human health, environmental and materials effects, remain ill–defined. The absence of long–term data bases and resource inventories add to the difficulty of determining the resources damaged or at risk.

The Committee concludes that the Ministry of the Environment should take a lead role in expediting the needed research through expertise available in government ministries, as well as by supporting research undertaken by universities and other research bodies. The Ministries of Health, Natural Resources and Agriculture and Food should coordinate their efforts with the Ministry of the Environment on these matters.

The following items are a list of some of the areas where additional research is needed. In particular, the Committee is of the opinion that the potential health effects of acidic deposition are emerging as the most significant negative impacts. In addition, significant research is required to work toward establishing target loading levels for total acidic deposition to protect terrestrial ecosystems, materials, and human health.

- Little work has been done to quantify the total health risk of airborne acidic deposition in Canada. Carefully designed and controlled epidemiological studies are needed to relate exposure to various air pollutants to the health of susceptible individuals and sub–populations.
- Standards have not been defined for the transformation products of sulphur dioxide and nitrogen oxides (e.g. sulphate or nitrate containing particulate matter). Research needs to be undertaken to define standards for human health for these transformation products, taking into account particle size.
- Because acidic deposition appears to increase the mobilization of metals from soils as well as water distribution systems, the concentrations of both environmentally occurring mercury and aluminum as well as corrosion products such as lead and cadmium in acidified drinking water need further documentation.

- The manner in which drinking water sources are affected by sudden contaminant additions from snowmelt and spring run-off also requires further study.
- Development of time series data bases of water chemistry monitoring combined with measurements of acidic deposition are needed to further substantiate evidence of changes in trends in aquatic chemistry due to acidic deposition.
- Variations of within-system alkalinity generation and the rate of weathering of basic materials in watersheds must also be defined in relation to the deposition of acidifying substances.
- Aquatic resources need to be inventoried more precisely across central and eastern Canada so that resources at risk from acidification can be better defined.
- Surveys of tree damage as well as controlled field study and simulations need to continue to better define the effects of acidic deposition on vegetation.
- Food chain responses to acidification through loss of food supplies, loss of nutrients as well as accumulation of toxic metals, must be more precisely defined.
- The effects of acid rain on buildings need to be distinguished from other corrosion processes. Coordinated laboratory and field studies involving materials scientists and experts in monitoring pollution and microclimatic factors must be undertaken to achieve this.
- Surveys of the extent of deterioration and corrosion of selected materials on buildings across Canada is needed to establish a ranking for the degree of risk that the various materials are facing and provide a data base for determining future research priorities.
- There is limited economic data on the existing and potential financial costs of acid rain damage. Dose-response rates must be formulated for the components of each of the resources affected by acidic deposition and resource inventories are required to facilitate more reliable estimates of economic damages.
- Increased research needs to be conducted on the effects of nitrogen oxides on short-term acid shock of aquatic ecosystems as well as the effects on health and long term effects on vegetation and soils.

APPENDIX A

TERMS OF REFERENCE

Votes and Proceedings No. 93

Tuesday, January 27, 1987

That the Select Committee on the Environment established on July 10, 1985, be empowered to review and report its recommendations on bilateral environmental issues as they affect Ontario; that the Committee have authority to sit during any adjournment of the House and any recess between Sessions subject to approval of the House Leaders, and have authority to adjourn from place to place, subject to budgetary approval by the Board of Internal Economy; that the Committee have authority to release its reports during any adjournment or recess of the House by depositing a copy of any report with the Clerk of the Assembly and upon the resumption of the sittings of the House, the Chairman of the Committee shall bring such reports before the House in accordance with the Standing Orders; and that the Committee have power to call for persons, papers and things and to examine witnesses under oath, and the Assembly doth command and compel the attendance before the said Committee of such persons and the production of such papers and things as the Committee may deem necessary for any of its proceedings and deliberations, for which the honourable the Speaker may issue his Warrant.

APPENDIX B

LIST OF WITNESSES
(in order of appearance)

Tuesday, 24 February 1987

Ministry of the Environment

Dr. David Balsillie, Assistant Deputy Minister,
Environmental Services Division; Carl Griffith,
Senior Economist, Policy and Planning Branch;
Wayne Scott, Co-ordinator, Acid Precipitation
Office

Ministry of Natural Resources

Dr. Douglas Dodge, Supervisor, Environmental
Dynamics Section; Tim Millard, Executive Co-
ordinator, Outdoor Recreation; Robert J. Bugar,
Assistant Deputy Minister, Southern Ontario;
Valanne Glooschenko, Wetland Habitat Co-ordinator

Wednesday, 25 February 1987

Ministry of the Environment

Wayne Scott, Co-ordinator, Acid Precipitation
Office

Falconbridge Limited

F. G. T. Pickard, Vice-President, Metallurgy and
Engineering; G. B. Reed, Vice-President & General
Manager, Sudbury Operations; Dr. L. E. Seeley,
Manager, Metallurgical Technology

Inco Limited

Roy Aitken, Executive Vice-President; Charles
Ferguson, Director, Environmental Control

Thursday, 26 February 1987

Ministry of the Environment

Wayne Scott, Co-ordinator, Acid Precipitation
Office

Ontario Hydro

Tom Campbell, Chairman; Ron Taborek, Co-ordinator,
Acid Gas Control Program; Art Hill, Director of
Systems Planning; Joe Walters, Director of Thermal
and Hydraulic Generation; Al Holt, Director of
Fuels

Tuesday, 3 March 1987 (Travel to Lakeview)**Ontario Hydro**

T. W. B. MacFarlane, Station Manager; D. B. Howden, Supervising Design Engineer, Projects & Services; Gus Ezers, Senior Project Engineer, Flue-gas Desulphurization; Ron Taborek, Co-ordinator, Acid Gas Control Program; Scott Lowes, Technical Supervisor, Lakeview; Henry Makuch, Chemicals, Fuels & Environment Superintendent, Lakeview

Wednesday, 4 March 1987 (Travel to Sudbury)**Falconbridge Limited**

George B. Reed, Vice-President & General Manager, Sudbury Operations; Dr. Larry Seeley, Manager, Metallurgical Technology; Lyle McKague, Smelter Superintendent; Richard Lane, Custom Feed Superintendent & Technology; Bob Brailey, Manager, Human Resources and Public Affairs

Inco Limited

Bob Brown, Vice-President, Milling, Smelting, Refining, Ontario Division; Larry Banbury, Superintendent, Environmental Control, Ontario Division; José Blanco, Manager, Copper Cliff Smelter; Marty Puro, Superintendent, Copper Cliff Mill; Peter Ryan, Manager, Central Mills; Morry Brown, Director, Public Affairs

Thursday, 5 March 1987**District Municipality of Muskoka**

Sheilah Hatch, Chairman, Acid Rain Committee

Canadian Coalition on Acid Rain

Adele Hurley, Executive Co-ordinator; Michael Perley, Executive Co-ordinator; André Foucault, Canadian Paperworkers' Union; Roly Michener, Executive Director, Tourism Ontario; Jean Anthon, Federation of Ontario Cottagers' Association

Tuesday, 10 March 1987**University of Toronto**

Professor Don Dewees, Faculty of Economics; Professor John M. Shaw, Dept. of Chemical Engineering and Applied Chemistry; Professor C. R. Phillips, Dept. of Chemical Engineering and Applied Chemistry; Professor Jim Keffer, Mechanical Engineering

Wednesday, 11 March 1987

Ontario Hydro

Tom Campbell, Chairman; Art Hill, Director, Systems Planning; Joe Walters, Director, Thermal and Hydraulic Generation; Al Holt, Director of Fuels; Ron Taborek, Co-ordinator, Acid Gas Control Program

Ministry of the Environment

Wayne Scott, Co-ordinator, Acid Precipitation Office; Giles Endicott, Abatement Policy Co-ordinator, Acid Precipitation Office; Carl Griffith, Senior Economist, Socio-Economics; Dr. Prasanta Misra, Supervisor, Atmospheric Model Dev. Unit; Lou Shenfield, Manager, Air Quality and Meteorology Section

Thursday, 12 March 1987

Ministry of the Environment

R. M. McLeod, Deputy Minister

Environment Canada

Alec N. Manson, Manager, Senior Long Range Transport Air Pollutant Liaison Office; Hans C. Martin, Senior Advisor of Senior Long Range Transport Air Pollutant Liaison Office

Wednesday, 15 April 1987

Ministry of the Environment

Wayne Scott, Co-ordinator, Acid Precipitation Office

Ontario Medical Association

John Krauser, M.A., Associate Director, Health Services; Dr. Neva Hilliard, Chairman, OMA Committee on Public Health; Dr. Ernest Mastromatteo, Professor, Occupational and Environmental Health Faculty of Medicine, University of Toronto Consultant, Environmental and Occupational Health Member, OMA Committee on Public Health

E. J. Hanna and Associates

Ed Hanna

Richard Wegman

Institute for Environmental Studies
Dr. Tom C. Hutchinson; Craig Kinch

Thursday, 16 April 1987

Algoma Steel Corporation Ltd.

R. Gordon Paterson, Vice-President, Engineering and
Technical Services; Mike Jennings, General
Manager, Coke and Iron Production; Fraser Craig,
Supervisor, Environmental Controls

Canadian Coalition on Acid Rain

Adele Hurley, Executive Co-ordinator; Michael
Perley, Executive Co-ordinator

APPENDIX C

LIST OF EXHIBITS

February 24th to May 6th, 1987

<u>Date</u>	<u>Exhibit No.</u>	<u>Title</u>
Feb.24	2/01/001	INCO LIMITED - Submission entitled "Progress Report - July 1986 - Inco Limited Sudbury Smelter Complex - SO Emission Control - Regulation 660/85 - 12 December 1985".
Feb.24	2/01/002	INCO LIMITED - Submission entitled "Progress Report - January 1987 - Inco Limited Sudbury Smelter Complex - SO Emission Control - Regulation 660/85 - 12 December 1985."
Feb.24	2/01/003	MINISTRY OF THE ENVIRONMENT - Report entitled "Countdown Acid Rain - Summary and Analysis of the First Progress Reports by Ontario's Four Major Sources of Sulphur Dioxide".
Feb.24	2/01/004	MINISTRY OF THE ENVIRONMENT - Report entitled "Countdown Acid Rain - Ontario's Acid Gas Control Program for 1986-1994".
Feb.24	2/01/005	FALCONBRIDGE LIMITED - Submission dated July 31, 1986 entitled "Progress Report No. 1 - SO Abatement Program - Period 1984 - June 1986".
Feb.24	2/01/006	FALCONBRIDGE LIMITED - Submission entitled "Progress Report No. 2 - SO Abatement Program - Period July 1986 - December 1986".
Feb.24	2/01/006A	FALCONBRIDGE LIMITED - Booklet entitled "Keeping It Clean...Everybody's Business".
Feb.24	2/01/007	Excerpt from <u>The Ontario Gazette</u> relating to Regulations made under the <u>Environmental Protection Act</u> .

Feb.24	2/01/008	ALGOMA STEEL CORPORATION LIMITED - Letter dated February 3, 1987 from A. V. Berdusco, Corporate Manager, Raw Materials, Purchasing and Traffic relating to the Ontario Government's response to Algoma's first progress report.
Feb.24	2/01/009	ALGOMA STEEL CORPORATION LIMITED - Letter dated July 4, 1986, from Peter Nixon, President and Chief Operating Officer relating to Part 3 of the Regulation, under the <u>Environmental Protection Act</u> with respect to the discharge of sulphur dioxide from the Algoma Ore Divison sintering operation at Wawa.
Feb.24	2/01/010	ONTARIO HYDRO - Submission entitled "Ontario Hydro's Acid Gas Control Program - July 31, 1986 Status Report".
Feb.24	2/01/011	ONTARIO HYDRO - Submission dated January 26, 1987 entitled "Ontario Hydro's Acid Gas Control Program - Second Progress Report - January 1987".
Feb.24	2/01/012	ONTARIO HYDRO - Submission entitled "Presentation to The Special Committee on Acid Rain - House of Commons, Ottawa, February 17, 1987".
Feb.24	2/01/013	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated February 1987 entitled "Ontario's Acid Rain Control Program - A Review".
Feb.24	2/01/014	MINISTRY OF THE ENVIRONMENT - Ontario Presentation to the Special Committee on Acid Rain dated February 19, 1987 by The Honourable Jim Bradley, Minister of the Environment.
Feb.24	2/01/015	MINISTRY OF THE ENVIRONMENT - "Introductory Remarks to the National Task Force on Environment and Economy" dated February 18, 1987 by The Honourable Jim Bradley, Ontario Minister of the Environment.

Feb.24	2/01/016	MINISTRY OF NATURAL RESOURCES - Submission entitled "Remarks by R. J. Burgar, Assistant Deputy Minister, Southern Ontario" dated Tuesday, February 24, 1987.
Feb.25	2/01/017	UNITED STATES DEPARTMENT OF DEFENSE- Information Packages for two proposed low-level military flight operations routes in Canada prepared by Department of the Air Force, the U.S. Strategic Air Command (SAC), Offutt AFB, Nebraska, with information furnished by the North American Aerospace Defence Command (NORAD), Peterson AFB, Colorado and National Defence Headquarters, Ottawa, Ontario dated December 2, 1986.
Feb.25	2/01/018	Newspaper clipping from The Globe and Mail dated Friday, February 13, 1987 entitled "U.S. low-level military flights to be resumed over Ontario".
Feb.25	2/01/019	Newspaper clipping from The Globe and Mail dated February 17, 1987 entitled "USAF training flights in Canada draw protests from peace activists".
Feb.25	2/01/020	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer entitled "Research on the Effects of Acid Rain" dated February 25, 1987.
Feb.25	2/01/021	ALGOMA STEEL CORPORATION, LIMITED - Letter dated February 23, 1987 from James T. Melville, Vice-President, Treasurer and General Counsel to the Select Committee on the Environment relating to their appearance before the Committee.
Feb.26	2/01/022	ONTARIO HYDRO - Submission dated February 26, 1987 giving a review of 1. Ontario Hydro's position on reducing acid gas emissions; 2. Progress to date; and 3. their Control Program.

Feb.26	2/01/023	ONTARIO HYDRO - Opening Remarks dated February 26, 1987 by Tom Campbell, Chairman.
March 5	2/01/024	MINISTRY OF THE ENVIRONMENT - Minister's orders to Falconbridge Nickel Mines Limited to comply with their recommendations relating to the Air Pollution Control Act, 1967.
March 5	2/01/025	MINISTRY OF THE ENVIRONMENT - Minister's orders to The International Nickel Company of Canada, Limited, Copper Cliff, Ontario to comply with the recommendations relating to the Air Pollution Control Act, 1967.
March 5	2/01/026	PAUL HANSEN - Introduction and Executive Summary from the report entitled "Acid Rain and Waterfowl: The Case for Concern in North America".
March 5	2/01/027	PAUL HANSEN - Report entitled "Acid Rain and Waterfowl: The Case for Concern in North America" dated February 1987.
March 3	2/01/028	MINISTRY OF THE ENVIRONMENT - Background information on low-level training Route IR 610 dated March, 1987.
March 3	2/01/029	LEGISLATIVE RESEARCH SERVICE - Information requested on low-level U.S. military flights approved for northern Ontario compiled by David Neufeld, Research Officer entitled "Northern Ontario Flight Corridor" dated March 3, 1987.
March 5	2/01/030	FALCONBRIDGE LIMITED - Copy of presentation given by Mr. Pickard on slides at the February 25, 1987 Committee meeting.

March 5	2/01/031	LEGISLATIVE RESEARCH SERVICE - Submission entitled "Testimony before the Subcommittee on Environmental Protection of the Committee on the Environment and Public Works on Acid Rain and Clean Air" presented by Richard M. Markewicz, M.D., F.A.A.P. dated February 3, 1987, Washington.
March 5	2/01/032	CANADIAN COALITION ON ACID RAIN - Presentation to the Select Committee on the Environment dated March 5, 1987.
March 10	2/01/033	PROFESSOR DEWEES - Presentation dated March 10, 1987 entitled "Countdown Acid Rain".
March 10	2/01/034	PROFESSOR SHAW - Submission dated March 10, 1987 relating to "Critique of Ontario's Acid Gas Control Program".
March 10	2/01/035	PROFESSOR PHILLIPS - Submission dated March 10, 1987 entitled "Comments on the Countdown Acid Rain Program of the Ontario Ministry of Environment, and Reports relating thereto".
March 10	2/01/036	PROFESSOR PHILLIPS - Recommendations for Ontario Hydro, Algoma Steel, Falconbridge and Inco.
March 10	2/01/037	PROFESSOR KEFFER - Submission entitled "Outline of Comments of Ontario's Acid Gas Control Program" dated March 10, 1987.
March 11	2/01/038	MINISTRY OF THE ENVIRONMENT - Summary and Analysis of the Second Progress Reports by Ontario's Four Major Emission Sources of Sulphur Dioxide.
March 11	2/01/039	ONTARIO HYDRO - Summary of Presentation dated March 11, 1987 given by Mr. Campbell, Chairman.
March 11	2/01/040	ONTARIO HYDRO - Presentation to the Select Committee on the Environment dated March 11, 1987.

March 11	2/01/041	MINISTRY OF THE ENVIRONMENT - A chart given by Mr. Griffith entitled "Summary of Incremental Benefits or Losses".
March 12	2/01/042	MINISTRY OF THE ENVIRONMENT - Submission by the Honourable Jim Bradley, Minister of the Environment entitled "Remarks to Select Committee on the Environment" dated March 12, 1987 and submission entitled "Canada/Ontario Agreement respecting a Sulphur Dioxide Reduction Program" dated March 10, 1987.
March 12	2/01/043	ALEC MANSON, ENVIRONMENT CANADA - Submission dated March 12, 1987 entitled "Acid Rain - A Federal Perspective".
April 15	2/01/044	D. V. BATES AND R. SIZTO - Excerpt entitled "A Study of Hospital Admissions and Air Pollutants in Southern Ontario" from report entitled "Aerosols: Research, Risk Assessment and Control Strategies".
April 15	2/01/045	TREE LOVERS' COALITION - Package of material relating to forest decline -- its nature and causes from Dale M. Willows, Ph D.
April 15	2/01/046	LEGISLATIVE RESEARCH SERVICE - Report dated April 3, 1987 prepared by David Neufeld, Research Officer entitled "United States/Mexico Sulphur Dioxide Control Annex".
April 15	2/01/047	AMERICAN ACADEMY OF PEDIATRICS - Submission dated February 3, 1987 entitled "Statement of Thomas Godar, M.D., on behalf of the American Lung Association to the Subcommittee on Environmental Pollution Committee on Environment and Public Works, United States Senate re: Health Effects of Acid Rain Precursor Pollutants".
April 15	2/01/048	ONTARIO MEDICAL ASSOCIATION (OMA) - Presentation dated April 15, 1987.

April 15	2/01/049	E. J. HANNA AND ASSOCIATES INC. - Submission dated April 15, 1987 entitled "Review of Countdown Acid Rain Program".
April 15	2/01/050	RICHARD WEGMAN - Submission dated April 15, 1987 entitled "Testimony of Richard A. Wegman".
April 16	2/01/051	ALGOMA STEEL CORPORATION LTD. - Submission dated April 16, 1987 entitled "Environmental Control at Algoma Ore Division".
April 16	2/01/052	THE CANADIAN COALITION ON ACID RAIN - Submission dated April 16, 1987 entitled "Notes for a Presentation to the Ontario Select Committee on the Environment".
May 6	2/01/053	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated April 13, 1987 entitled "Inco's Emission Limits: Are They Achievable?".
May 6	2/01/054	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated April, 1987 entitled "Acidic Deposition in Ontario: Issues and Options".
May 6	2/01/055	LEGISLATIVE RESEARCH SERVICE - Report prepared by Wendy MacDonald, Research Officer dated April 1987 entitled "Countdown Acid Rain Public Participation Options".
May 6	2/01/056	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated April, 1987 entitled "Acid Rain Damages and Research Needs".
May 6	2/01/057	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated April, 1987 entitled "Economic Incentives for Acid Rain Control".

May 6	2/01/058	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated April 14, 1987 entitled "The Costs of Acid Rain Control".
May 6	2/01/059	LEGISLATIVE RESEARCH SERVICE - Report prepared by David Neufeld, Research Officer dated April, 1987 entitled "Ontario Hydro's Banking Provisions".



ISBN 0-7729-2546-1